

Intelligent Trolley

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Intelligent Trolley

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Contents

ABSTRACT	4
INTRODUCTION	6
BACKGROUNDS	7
FINANCE	14
COST OF TROLLEYS.....	14
PURCHASE OF INTELLIGENT TROLLEYS	14
SAVINGS OFFERED BY INTELLIGENT TROLLEYS	16
AFFECT ON CUSTOMERS	16
AVAILABILITY OF SPACE.....	19
IMPACT ON EFFICIENCY.....	20
FEASIBILITY FOR THE SUPERMARKETS	20
ONLINE SALES	20
SHOPLIFTING AND THEFT IN STORES AND SUPERMARKETS	22
IMPACT ON CUSTOMERS AND STORES	23
FEASIBILITY OF INTELLIGENT TROLLEY	23
FEATURES OF INTELLIGENT TROLLEY	24
1. ONLINE UPLOADING	24
2. LOYALTY CARDS	25

3. LCD AND NAVIGATION.....	26
4. PURCHASE OFFERS	27
5. BARCODE READER OR PRODUCT SCANNER.....	28
6. PRODUCT INDICATOR.....	29
7. SPEEDING UP TRANSACTIONS	31
SECURING THE PRODUCT AND TROLLEY	32
1. WEIGHT SCANNER	32
2. 360 DEGREE SCANNER/ BAR CODE READER.....	32
3. TROLLEY JAMMER.....	33
4. TROLLEY INDICATOR	33
5. BUYING TROLLEY	34
EXTRA FEATURES	34
SURVEY ANALYSIS	35
CONCLUSION	40
Other Researches	40
Current Research.....	41
Recommendations.....	41
Limitations	42
Bibliography	44

Intelligent Trolley

ABSTRACT

Intelligent trolley is still a new concept and has modified the regular shopping experience. Study of the different literatures and research on this new technology shows their work on this. The studies highlight that the intelligent trolley has provided more convenience and has eased shopping. Besides convenience it has saved time there is no need for the consumers to stand and wait in the long queues to pay for their purchases which the consumers have been complaining about before. Studies also highlight the technological improvement that has been done over the shopping cart or trolley and the variety of services it offers to the consumers. Studies have discussed about the Radio Frequency Identification (RFID) system that has been installed in the intelligent trolley. RFID is a more resistant and safer technology it identifies the product and provides long range of information. To read the products RFID does not need direct contact and has a high range. RFID connects the cart with the store's system and provides navigation to the consumers throughout the aisles of store and identifies product location for them.

My research conducted over the intelligent trolley highlights the impact it had over the supermarkets and the retail stores. Stores competed over the prices however the introduction of intelligent trolley has provided them competitive edge. It signifies the investment and the finance store would be required to make in order to introduce such technology. It highlights that the initially finance would be required but the benefits it would provide would outweigh the costs. It

would provide the internet access to the consumers, upload their shopping list and download it at their trolley. The navigation system would provide them the exact location of their products even the specific products could be highlighted. Time wasted in finding the products would be saved and the consumers would not be required to stand in long queues. Intelligent trolley also provides some extra features that are extra service and entertainment to the customer. It is shown that different companies have worked on RFID scanners like Fujitsu and Microsoft who have launched their products and are modifying it as per the needs of the market and the consumers.

This research revealed that the introduction of this technology would require some finance and the stores would have to bare some costs in order to upgrade the IT systems. The supermarkets and the retails store have normally competed over the costs and tried to provide low price products to the customers however it has become hard to compete on this ground. The introduction of intelligent trolley would provide competitive edge to the stores as they would be offering extra services to the customers. The prices that the stores offer are almost the same these new features offered in the form intelligent trolley would attract more customers. It would decrease the complaints they had regarding shopping at the stores. Intelligent would reduce their shopping time no long waiting and roaming in the aisles for finding the products would be required.

INTRODUCTION

Intelligent trolley has a scanner attached to it, as you fill your trolley the scanner adds up the cost of all your products so you don't have to. No surprises! Intelligent trolley will also print out a receipt at the end of your shop to hand over to the cashier for an easy and swift payment. The cashier will just need to scan the receipt, instead of every product. This will improve not only the shopping experience for the customer, but will also improve staffing costs as less time will be taken to serve the customer taking up less space and there will be no need for long conveyer belts anymore. The intelligent trolley will change the way we shop. It is the future of the shopping and the shopping carts it would change the way people shop. Trolley is a simple device but still can be improved and made to make shopping more comfortable for the consumers. In the super markets customers are always keen to get the things quickly and try to find everything immediately. It hard for the customers to find the products they require in the super market and sometimes they have to stand in the long queues to pay for the products they have picked from the shelves in the super market. Intelligent shopping trolley is the solution that has come for the convenience of the consumers, super market or retail stores can utilize the intelligent trophy to attract customers and provide extra customer service in the form of comfort, ease and time saving. Different kinds of scanners have been used to speed up the process inside the super markets and grocery stores. The intelligent trolley introduced by the 2QCR coded YQ 9000 recognizes the use of the material that has been removed from the shelf to allow for the data collection of the stock and was mainly used in the libraries (2QCR, 2012). Self check out machines has become much around the world. They are an alternative to the traditional pay to the cashier system and the customer does not have to interact with the staff of the superstore.

Customers can pay for their purchases from the retailer directly through the self checkout system. Intelligent trolley name given to the shopping trolleys with the scanners that can read the bar code from the products and price them is a great modification to this little device and hence would make shopping much easier. There are already some intelligent trolleys introduced in the market by some big companies like Microsoft who has installed its latest specially designed operating systems in to the trolley or the cart along with it Fujitsu has also launched shopping cart or trolley with the scanner attached to it.

Backgrounds :

The story behind this idea?

While out with a friend of mine who is quit over weight, I noticed how he struggled to walk or stand up for long periods while shopping at Tesco it was very busy and when we came to pay there was a very long queue. My friend could not stand all that time, so he asked me if I could help him and wait in the queue for him. I remember thinking if I was not there how would he manage and buy the things he needs. I wondered how many people like my friend are there? People who just can't wait for long periods to do their shopping and then I thought why should anyone have to spend that much time waiting in the queue to pay ! This is why I came up with this idea to change the way we shop, had anyone come up with this idea before?

When I thought about the intelligent trolley I thought about three features.

A feature that could tell the customer how much they had spent as they shopped.

Fast payment from a cashier or the self-service.

More information about the products, availability, location, and nutritional information for the type of food you want for example (Vegetarian, Halal).

I made some research to see if anyone had thought about this idea or similar. I found that there are some similar ideas to the intelligent trolley.

Microsoft the biggest software company in the world has developed an intelligent shopping trolley. This trolley has many features, it has a radio frequency receiver that can receive the radio frequency from the shop system and get all the information the customer needs. It also has a plasma screen attached to the trolley that can tell the customer about the prices of the items and the total of your shopping at the time and the customer can receive further information about the offers and view new items the shop has, It can guide the customer to find the products in the shop by using an intelligent map system. Also it has an entertainment program so you can listen to music and surf the Internet. In addition it has scanner that the customer need to swap the loyalty card at the beginning of their shopping the system will display advertisements that the customer likes based on information about past shopping. Microsoft is using several technologies in this trolley such as Windows CE and Microsoft SQL Server. This cart can send a signal to the system if someone leaves or dumps the trolley. Operators can check where exactly every trolley is, saving money for the company by stopping the loss of trolleys (1).

Fujitsu is a Japanese multinational information technology equipment and services company it has developed an intelligent shopping trolley and named it (U – Scan Shoppers). The system in U-scan shoppers include many services such as (item scanning, self checkout, offers, check price of items, locator, download shopping list).

Fujitsu made some studies in this field and they found that 60 per cent of customers had thought about checking out quickly and automatically using new technology, based on this study they designed U – Scan Shopper to avoid long checkout lines and price labelling, item location and other service. For example with this trolley you do not need to write your shopping list on a piece of paper, you can upload to a website and as soon as you get to the shop all you need to do is scan your shopping card in the trolley scanner and all your data will display on the trolley plasma screen include your shopping list, offers you might be interested in and advertisements based on your past shops. While you move thru the store the intelligent system will target customers and display adds based on customer location it can tell them about new offers in that section or aisle or new products and if the customer is new in the store or does not have a shopping card the system can still display adds and offers based on the customer's location in the store. It provide's a real 1:1 marketing and customers loyalty for companies, that will allow companies to minimize the cost of advertisement by not wasting money on adds for specific people that would never buy that product. For example a women with 3 young children, would have a completely different needs to an elderly lady, and by specifically targeting people with there needs, you are much more likely to make a sale.

The display unit's browser-based applications run on Microsoft Windows CE .NET.

This software works with Fujitsu U – Scan self-check out systems and with most check out and POS applications, for example IBM's Supermarket Application and SurePOS ACE. It also works with objects within Microsoft Smarter Retailing and Fujitsu is a member. Smarter Shopping, enable's retailers to take advantage of IT investments and they can get a clear idea about what customers want and provide a better service to them. "Fujitsu said U – Scanner Shopper has brought an important product to the market that addresses what time-pressed shopper value most:

excellent service, improve product availability, targeted promotions and convenient access to information that makes it easy to make informed decisions, “says Brian Scott general manager for Microsoft’s Retail & Hospitality industry unit. “ The U – Scanner Shopper is an excellent Microsoft smarter Retailing solution. It helps retailers tailor the shopping experience, differentiate themselves from computer loyalty.”

Developing this kind of technology needs other technologies to support it and needs acquired worldwide patents and other rights. Rod Vawdery, CEO of Fujitsu Australia and New Zealand Says “We believe that the one to one electronic communication of the U – Scanner shopper, its point of selection delivery and its patent portfolio provide a formidable first position in the in store marketing.” (2)

How does new technology change the way we shop?

Technology has a big impact on our life and has changed almost everything we do in the last 50 years in many field. Shops and big stores are using lots of techniques and technology that make the shopping experience a lot different to both customers and retailers such as (electronics chasers, bar codes, data base, modern management systems).

In recent years big stores in the UK and other countries have started using self-checkout machines. Self-checkout is a hardware system that can enable retails to complete the shopping process and finish the payment automatically, customers can help themselves to scan the items there buying. It allows customers to scan the barcode and that will update the stores database, deactivate anti theft tags in some items and the customer can bag the items and make the payment by two methods cash (notes, coins), debit or credit card after finishing the payment the machine will print out a receipt and your free to walk out. This process looks easy but it includes

many complicated methods to finish it without human intervention. There were many hurdles faced with self checkout machines and one of the biggest hurdle is that customers need to do all the work by themselves and don't not get full service needed. For example in America gas stations started offering a discount for customers who use self service and checkout just to encourage customers to use it and nowadays u can hardly find a full service gas station in the United States. The second hurdle was how customers can make payments for their items by cash or credit card and how to do all this process successfully from getting the exact change and end the payment without any errors.

How do they make self checkout secure? Self-checkout needs more technical solutions to make checking out more secure than manned lines. To keep it safe from thieves or shoplifters or even peoples mistakes. There's lots of methods we are using now to keep self checkouts secure for example electronic article surveillance (EAS) and this makes sure the item has been scanned by the customer using video surveillance. However there is a big challenge manufacturers and developers are facing and that is shoplifters and thieves scanning a cheap item and placing an expensive one into the bag. They thought about two ways to stop this. First one is to add some new features to self checkout machines which is using scales in the bagging areas of supermarkets (stores) and using a database for every item including its weight. So when the customer scan's an Item and place's it on to the bagging area (the scale) the system will check and compare between the item and its weight in the database if they are the same the transaction will complete if not it will stop and make a warning sound. This might be a good idea in theory but fundamentally it will slow the process and annoy customers when it stops them to check and ask for assistance. The other solutions are closed circuit televisions to check and monitor the scan process. So the products in the store can monitor and watch the customer when he scans an

item and they can see what he's scanning and what he's putting in the bagging area and this needs to connect the self checkout with the store system and the monitor. However staff cannot check every single scan in busy stores and supermarket's that would be impossible, but they can check randomly and focus on anything suspicious, hopefully thieves and shoplifters will be scared to steal if they know they might be being watched and hopefully reduce chances of stealing.

To design and make self checkout machine's u need to understand several things such as scanners, algorithms, how to use computer, conveyor, scales all these need to be together to understand how to make the machine. There are very few manufactures making self check out systems and the biggest most famous companies making it are NCR, IBM, and Fujitsu. These three big companies account for more than 96 per cent of the market. NCR has a long line of experience making the equipment for several years and are well known in the U.S. they supplied more than 236 stores for Tesco in the UK in 2005 and supplied Marks & Spencers in Germany and the UK. IBM is providing the software solution and building the system for self checkout machines because it has a good experience in this field. IBM has designed PSI for self checkout machine and CheckRobot and announced that they designed the new generation of self check out systems with lots of changes to improve the performance. Fujitsu is the latest company and becoming a strong competitor for both NCR and IBM. It released its first self-checkout machine in 2004 and called it U – Scanner shopper. According to researching at IHL shows there were over 200,000 self checkout lines in operation at the end of 2007 and this number will be likely to double in next five years, that shows there is a massive growth in this market.

According to IDC's 2004 the research shows self checkout creates value across the retail stores and customers like to participate in self checkout. The research polled about 6 retailers in 7

different countries. These countries have more than half of the self-checkout systems in place for more than six months. It showed also that between 25 to 50 per cent of the sales and transactions made were done by self-checkout machines and customer's attitudes about the self-checkout experience were positive. In addition retailers said using new technology to checkout enabled staff to do other work in the store to increase the sales and of course save money. Most people use self check out machines in supermarkets for many different reasons, because people go shopping more often and in busy areas there are long queues this is a big problem for some people as allot of people are in a rush and lead hectic lives. Supermarkets are not the only business's using this technology many stores in different sectors are now using it too, for example libraries to buy or hire books, gas stations, travel agents .

FINANCE

The intelligent trolleys are the introduction of the new technology and thus introduction of new technologies always require finance. Finance is hence required in any kind of up-gradation or changes that would promote the business or enhance the efficiency.

COST OF TROLLEYS

If the retail stores or the super markets have to introduce the intelligent trolleys in to their stores they would be required to replace all the older trolleys. They would either have to purchase the new trolleys directly from the companies that are making the trolleys like Fujitsu and get the standard trolley. They can also order the trolley specially designed for their stores but it would cost them more. There is another in which the supermarkets or retail stores can utilize their old trolleys and yet provide the customers with the comfort of the intelligent trolleys. They can install the scanners in to their existing shopping carts or trolley. The scanners for the trolleys can be purchased from the Fujitsu as it has good name in electronics. The scanner would cost the super markets almost \$190 per piece on the other if they directly purchase the Fujitsu's specially designed U-Scan Shopper it would cost them almost \$250 per trolley pr cart (Amazon, 2012). It seems to be the better option as it offers wide features then the scanner or the bar code reader.

PURCHASE OF INTELLIGENT TROLLEYS

The retail shops or the super markets would be better off if they purchase the trolleys from the company who has specialized in their production instead of ordering it that would cost them more with less specialized trolleys. Fujitsu has launched the U-Scan Shopper few years back it features a wireless, trolley-mounted computer that gives shoppers information and scans the products as the consumer shops with extra convenience as the customers move through a store. It

also has the facility of locating the products for the customers. U-Scan Shopper offers consumers to upload their shopping lists to the grocer's Web site before they leave home and then can download that list to the trolley at the store (Fujitsu, 2005). As it has been shown in the research conducted over the UK supermarkets that the online sales of grocery has increased with the highest pace in UK as they trust the delivery system and it saves time. If the intelligent trolley would allow them upload the list of products and thus would save time and they would rather visit the stores as it would remove the issues they have relating the online purchasing. Tesco the most leading supermarket store in UK reports profits from online sales however the increase is not at the same pace as of the traditional sales (Kim & Niels, 2005). While moving through the store, the trolley would provide the detailed information of the list of the items uploaded by the customer and their location and price. The bulk purchase of the trolley would provide some discount and also the up-gradation offers in to the new products or technologies introduced as Fujitsu has introduced recently U-Scan Genesis that offers extra features then the U-Scan Shopper. Picture below gives the idea of how intelligent trolley would look like.



SAVINGS OFFERED BY INTELLIGENT TROLLEYS

Introduction of the intelligent in to the retail stores and the super markets by their owners or the managers would initially require them to make investments for this purpose and some finance would have to be allotted for the introduction of this new technology. However, in the long-run it would be beneficial for them as it would offer some-thing new and different to the customers and they would perceive it as an extra customer service to them with no extra cost. It would ease their shopping and gain some positive perceptions for the supermarkets or the retail stores. Extra staff other than those at the cash collection and packaging that are there to guide the customers and help them find and locate the products would not be required in large number at the stores this would save the stores the cost of their salaries. Data relating to the arrangement of the stock would be easily managed and mostly would be automatically updated at the time the customer picks up the product and puts in the cart. Due to the long time that it takes to check the products for their prices supermarkets and retails stores often have many counters for the payment of the product. Hence more counters mean more employees and more wages to be paid with extra maintenance. With the products already billed by the intelligent trolley it would ease the process and the customer would only be required to pay for the products at hi exit. Therefore it would reduce the number of cashiers and counters needed at the store and saving the cost for their pay and the maintenance of the counters.

AFFECT ON CUSTOMERS

Shopping especially the grocery that involves the purchase of the daily items makes the visit to the stores and supermarkets. Shopping is the time consuming process and customers often find it difficult in locating the products and often have to wonder around the huge supermarkets. After taking all the products they need they often have to wait in long queues for the payment and

packaging of the products. It has often been observed by the managers and different researches also reveal that customers find it frustrating and irritating to stand in long queues still after they had completed their shopping just to pay for them (Mail Online News , 2012). There are often many stores and supermarkets in the close locality of the consumers and if any one of them offers something unique to the customers they would be probably attracted to it. Time is of the biggest essence in the present world and the introduction of the intelligent trolleys would allow the consumers to save time. It would also be convenient for them as the desired products would be easily located for them. There would no more any long queues that that would frustrate the customers and they would just easily pay and leave. Below is given the time customers have to wait in queues.

Average queuing time at stores in UK

- 1. Waitrose** 2 mins 51 seconds
- 2. Asda** 2 mins 57 seconds
- 3. Tesco** 3 mins 5 seconds
- 4. Sainsbury's** 3 mins 47 seconds
- 5. Morrisons** 3 mins 52 seconds



Above image shows the customers waiting in queues to pay for their groceries.

This expansion of service would attract new customers for the supermarkets and the retail stores and the finance allotted to the purchase of the intelligent trolleys would be recovered in the form of increase in revenues due to extra customers coming in to the store. The Office of Fair Trading (OFT) UK in its report disclosed that the UK supermarkets are facing fierce competition and the customers benefit from this competition as the competition is mainly over the prices and any promotional offers attached to the product (Trading, 2005). The introduction of the intelligent trolleys gives a different perspective and a competitive edge. It is often seen that the people in UK are concerned when they order online especially about the quality of food and especially when they are buying meat or vegetables they want to inspect it before purchasing. However due

to lack of time they have to order online if the new trolleys save their time they would be pleased to visit the stores for purchase of these perishable items (Susan, Mary, & Andrew, 2005).

AVAILABILITY OF SPACE

Introduction of new technology like the intelligent trolleys as explained would be able to total the price of the products picked by the customer. The large number of the cash counters is only to manage the customers as it is the time consuming process and every customer has different quantity and number of products. Hence the introduction of the intelligent trolleys by-passes this problem and would only require fewer counters at the store just for the quick collection of the payment and if the new technology that Fujitsu is working is launched would remove even those as customers would pay directly through their ATMs (Fujitsu, 2007). The removal of the counters would create extra space in the stores and that space can be utilized for extra products or even for the advertising. Any products that do not exist in the store and customer demands them and were not put in the store due to the lack of space can also be introduced as the space is available as extra counters have been removed. Space for advertising would bring income in the form of rent being paid by the companies utilizing the space. Sales would increase as customers would be purchasing the products that were not previously available in the supermarket or retail store and went elsewhere to shop for them. With internally available extra space supermarkets do not have to expand outside and build new space as there are already concerns being shown regarding the spaces occupied by the supermarkets in UK.

IMPACT ON EFFICIENCY

An innovative product with societal acceptance is the one that aids the comfort, convenience and efficiency in everyday life. Shopping carts or trolleys are very simple items and such innovation in them would be of huge attraction as this would bring comfort and convenience to the customers. However this investment is not only to be seen from the customer perspective it is also to be seen that would it be feasible for the efficiency, processes and working of the supermarkets.

FEASIBILITY FOR THE SUPERMARKETS

Introduction of intelligent trolleys would require some investment from the supermarkets at the time when they are concentrating over increasing the online sales and huge investments have been made over its expansion. It is a fact that the online grocery sales in UK market have seen the highest growth than other markets. However the growth of online sales is not that much as through traditional stores (Chris, Francesca, Patricia, Jaywant, & Ruth, 2009). Therefore the investment in the new technology can be made like the intelligent shopping trolleys as it would also provide them online access to manage their purchases and would make their shopping quick and efficient if they even physically visit the stores. Under the present circumstances of severe competition amongst the supermarkets all of them are trying to increase their online sales and in such scenario bringing something new and innovative would probably increase the customers.

ONLINE SALES

Developed countries like UK have seen an increasing trend towards the online shopping but still the growth is not so much. Some of the supermarkets have failed in their attempts to sale online

through their websites (Kim & Niels, 2005). Large number of people is still reluctant to purchase online due to the security issues, privacy matters, old thoughts (old age factor) and physical inspection of items before purchase restricts them from purchasing online. Research shows that huge customer base of people ageing more than 50 are not much attracted towards purchasing online and there has been no such marketing to attract them towards online purchasing or e-transaction. Therefore lucrative business techniques of bringing innovation like one that of introducing intelligent trolleys would increase the number of customers that visit the store (Wi-Suk & Mijeong, 2010). It has also been seen that the online shopping is mostly used by the customers because it saves them time and while most of the people doing online shopping miss the fun of going out for shopping. Both the problems will be solved by the introduction of these new trolleys as they would save the time of customers as it would be giving them option of uploading the shopping list online before coming to the store and would save them standing in long queues and along with it would bring them back the pleasure they found in going out for shopping. The old age customers is a huge customer base who are not attracted to the online sales would be hugely attracted by this introduction as it would reduce the labor used and increase convenience for them. This huge customer base has been neglected over the online sales marketing and mostly the youth is targeted thus customer base can only be completely retained in this way.

SHOPLIFTING AND THEFT IN STORES AND SUPERMARKETS



According to the surveys conducted in UK Shoplifters cost UK stores £4.4 billion annually and theft adds about £180 to the average family's annual shopping bill. These amounts are almost 5.8% lower than the previous year but the survey reveals that still an average of £12,054,794 worth of goods were stolen every day in the UK in the 12 months to 30 June. There is no doubt very high costs are spent over the security and thus detection and prevention of theft from the stores and that is the reason the costs have fallen by 5.8 % but it still is not such a huge number (news, 2010). The introduction of the intelligent trolleys would definitely reduce the shoplifting and theft. It is due to the reason that they are wireless attached computers that automatically detect and enlist the product taken and new Fujitsu U-Scan Genesis offers the 6 sided 360 degrees scanning and integrated electronic article surveillance (EAS). It would automatically detect the barcode and even if the product is saved from being scanned from the trolley the un-scanned products would cause a beep when being taken out without getting scanned. Thus the intelligent trolleys would not completely remove the shoplifting or theft but would definitely decrease it and the supermarkets or the stores would see a potential decrease in the costs.

IMPACT ON CUSTOMERS AND STORES

Customers and the stores would both benefit from the usage of intelligent trolleys the systems and processes of the store would become more efficient and responsive. The data maintenance of the stock would be automatic and up to date. Payment system would become more quick and efficient, management would be having low administrative burden as management would become easier as the staff would also reduce. Maintenance and management would hence become much easier. For the customers the shopping from the stores would become much convenient and less laborious even the working group that found easier purchasing online could come and visit the store for shopping as the time required would be reduced. One of the major issue of standing in queues for long would be removed or the waiting time would be reduced to a negligible level. Supermarkets would be seeing more satisfied customers and hence the satisfied customers lead to loyal customers. The availability of space and lesser management stress would enable the store owners or managers to think the ways in which they can utilize the space more efficiently and optimally.

FEASIBILITY OF INTELLIGENT TROLLEY

Shopping trolley or cart as discussed before is a modest item and adding features to it and making innovation to it would make it “intelligent trolley”. The features added to it are unique and offer something new to the customer it would change the way they shop and make it easier and comfortable. Intelligent trolley is a new concept and would definitely attract the customers, however it is to be seen that it covers the problems associated with the customers that they face in the supermarkets. This new concept of trolley would be a new introduction and would offer benefits not only to the customers but also to the supermarkets and retail stores. However it is to

be seen that does the benefits offered out weight the investment required and if benefits are below the investment and other associated costs then it would not be feasible for the supermarkets to invest for them. Innovations are required for lifting up the business performance and hence increase the revenue. Intelligent trolleys would be cheap and the supermarkets or the retail store would be required to replace all the existing trolleys and along with that they would also have to upgrade the systems that synchronize with the data that the trolley provides. The investment would also be required to be made in for the changes and up-gradation of the information technology (IT) or the systems being used. IT systems would be required to be changed because the intelligent trolleys would be working through the online systems and would also provide the customers online access.

FEATURES OF INTELLIGENT TROLLEY

Intelligent trolley is a new item and the modification to the simple shopping trolley or cart has made it unique and attractive. With the introduction of the intelligent trolley the shopping cart would not only be used for the purpose of carrying the products pickled from the retail store or the supermarket but would also serve a long range of services to the customers. Following below are the features that the intelligent trolley would possess.

1. ONLINE UPLOADING

Shopping trolley would have online wireless network system it would be attached online to the systems of the supermarket. Large number of customers uses websites of supermarkets and retail stores and search and locate the products they require. They would be provided with an online facility of choosing and uploading on the website of the supermarket or the retail store the products they would purchase when they visit the store. Intelligent trolley would have an option

of downloading the list of items uploaded on the website. The specific list would be accessed through the customer account offered on the website of the supermarket. The items chosen would be easily uploaded to the customer's personal account and would then be easily downloaded on the trolley. The customer's personal account would prevent the mixing up of the lists uploaded by the different customers.



2. LOYALTY CARDS

Customers are often offered loyalty or discount cards by the supermarkets or the retail stores. They are often used to attract the customers, keep the record of their transactions with the store and ensure that the

customer feels that they are known by the retail store or the supermarket. These cards often ensure the loyalty of the customer as they are used to monitor the transactions made by the customers, the points they gain, discount that would be offered and hence ultimately used to keep the customer satisfied and the satisfied customer leads to the loyal customers. The up-gradation of the IT systems would enable the stores or the supermarkets to keep the data up to date relating to the history of the transactions of the customer and the loyalty card given to the customer has the chip that would automatically store the data once inserted into the system of the store. The same data would be available online on the customer account on the website. The role intelligent trolley would play here is that it would give an option to the customer to insert his/ her loyalty

card in to the trolley. The card would provide all the information to the customer regarding his previous transactions and how much more points needed to gain discount of certain percentage. This information available in front of the customer would help the customer in making more rational purchasing decision. Customer can also utilize the information from its previous purchases and does not have to reload the list of the products he/ she needs to purchase.

3. LCD AND NAVIGATION

The customers at the retail store or the supermarkets face some problems and they are often seen complaining about the missing shelf labels, vague aisle signs, elusive shop assistants, long checkout queues and etc (Ben, 2010). intelligent trolley is an idea to prevent the retail stores and supermarkets from facing such issues from the customers. The intelligent trolley would be featuring a Plasma screen over a regular shopping trolley. The intelligent trolley would be equipped with a radio frequency receiver and a plasma screen that would allow the customer to interact with the system and do both receive and transmit information. The screen would be wireless touch-screen computer mounted the screen would be of almost 6 inches and would enlist all the options that the intelligent trolley offers. Along with the screen the trolley would have a navigation system installed in it and the directions would be displayed on the screen. The system installed in the trolley would guide the customer as he/ she walk through the aisle. The computer would provide the location of the product and its availability to the customer being displayed on the screen. The U-Scan Shopper produced and introduced by the Fujitsu offers the same features and has revolutionized the use of the shopping trolley (Fujitsu, 2005). Fujitsu is also working in making the U-Scan Shopper more secure and accurate and continuously researching and would nearly introduce the new model of U-Scan Shopper with some added

features. Right now the U-Scan shopper is almost depicts the same idea of the intelligent trolley.



The U-Scan Shopper's display can be customized to meet your needs.

4. PURCHASE OFFERS

Intelligent trolley would possess a wireless radio transmitter that would synchronize it with the system of the store or the supermarket (NEWS, 2012). Therefore all the information regarding the store and the offers that they are giving would be displayed on the screen of the intelligent trolley. The information regarding the offers would be available both in general and also regarding the specific aisle that the customer is walking. It is often that the customers are unaware of the discount or purchase offers that the retail stores or the supermarkets offer and even ignore the hoardings. However when the information would be displayed in front of the customer on the screen it would help the customer to gain the bargaining power and thus the customer would adjust his/ her purchases accordingly. It would also be beneficial for the retail stores or the supermarkets because almost all of the customers visiting the store would have the knowledge of the purchase offers and most of them would utilize the offer and hence would

ultimately increase the sales of the store and their revenues. Customer would also have the facility to find the offers relating to any specific product for example the customer would add the coke in the search option and would get the location, availability and along with these information regarding any offers like discount or buy one get one free etc that are being going over the coke would be displayed over the screen of the intelligent trolley.

5. BARCODE READER OR PRODUCT SCANNER



Customers often find the problem that they unconsciously pick up the products and cross the limit of the budget that they had kept for the shopping or specifically for the grocery. They get to know about the prices of the products and the total amount they are required to pay when the cashier scans all their products and it

creates a difficult situation they often either have to return the products or pay for it anyhow and hence cross their budgets.

It also creates problem for the retail stores and the supermarkets they have to put the products back that have piled up over the cashiers counter and cashier would have to reverse the entry in case the products are being returned as he has already scanned all the products that the customer brought to the counter. Therefore the intelligent trolley would be having a barcode reader or

product scanner attached to the screen that would display the price of the particular item scanned and also the total amount of the products that the customer has picked. This would help the customer plan its purchasing and even sometimes it would increase the sales of the store as if the customer has not reached its budget limit as he/ she would be getting the information they would probably be attracted to purchase more until they have reached their budgeted limit. The previous information available on the screen through the insertion of loyalty card help the customer to examine the increase in prices from the last purchases and would enable the customer to understand the increasing trend of prices and make him budget his purchases more rationally and hence control their expenses. Along with the barcode reader or product scanner the trolley at the end of the purchase as would be indicated by the customer would issue a receipt having the detail of the product and their prices along with the total amount to be paid all the discounts would be automatically adjusted. The customer would be required to show the receipt at the cash counter before the exit and would easily pay the cashier the required amount without getting in long queues to pay for the purchases.

6. PRODUCT INDICATOR

As the studies have shown that the purchasing decision of the customers is often influenced by their behavior. Consumer behavior is influenced by his/ her cultural background, religious and ethnic believes and mostly they affect the eating and consumption habits of the consumers (Charles, Bill, Chanaka, & Len, 2009). For example some people just eat vegetarian food, some find Halal food mostly Muslims as influenced by the teachings of

Islam, some customers locate specific meat like beef or fish etc. Along with it people often use or eat the products that does not contain certain ingredient as they are prone or allergic to it. This kind of product information would be available not only on the website but the product information along with its ingredients would be loaded on the intelligent trolley. Therefore the intelligent trolley would indicate the customers regarding the products he/she has purchased. They would have the facility either to enlist the product specific requirements on their account on the website of the supermarket or the retail store and download on the intelligent trolley or they can also highlight their requirements by choosing the options available on the screen of the trolley. For example if the customer has indicated for the Halal



food and has picked any product that does not contain Halal meat the trolley would indicate it to the customer or if the customer has requested for the organic products it would be indicated on the screen of the trolley if the product picked is not an organic. Hence this feature will

hugely in satisfying the customers as they would believe that their ethnic and religious beliefs are secured as the products they have picked for eating or consumption purpose is according to their beliefs. As the it has already been discussed that the trolley would be featuring the navigation, therefore it would indicate the specific products that the customer has requested for example it would be indicated on the screen that where are the organic products located in the store or the Halal food items or specifically vegetarian ready to eat packed food etc.

7. SPEEDING UP TRANSACTIONS

Intelligent trolley would speed up the transactions it would reduce the time that the customers used to spend in the long queues to pay and the time it took them to find the products they desired in the store. As the intelligent trolley would be integrated with the system it would automatically update the stock quantity and value in the systems, it would also adjust the changes in value due to the discounts and purchase offers not only in the list of the customer but also in the main system. This would prevent the chances of stock out and as the stock would be updated regularly and hence would prevent customers from switching to other product or store as happens in case of stock out (David, 2009). The receipt would be issued by the trolley and cashier would just collect the payment and pack the products. Cashier would be having the pre-information of the purchases of specific customer as with the insertion of loyalty card the customer would have logged on to the system of the supermarket and hence as he/she purchases it would be updated on the customer account and the cashier's system. This one time investment would save costs for the retail stores and supermarkets they would require less staff at the store, more space would be available due to fewer cash counters.

SECURING THE PRODUCT AND TROLLEY

Intelligent trolley is a big investment that the supermarkets and the retail stores would be making and hence would be required to protect it. They would also have to see that intelligent trolley protects the theft and shoplifting of the products from the store. The security of the products and the trolley would also be the part of the features of the trolley.

1. WEIGHT SCANNER

Trolley would have the scanner that would accumulate the weight of the products that have been put in to the trolley along with the total price. Even if some item is left to be scanned by the



customer its weight would appear on the screen in the trolley. Cashier having the detail of the products would see that and match the weight of the products with the total products that are shown on the list issued by the trolley. As the cashier would have the detail of all the products that have been scanned he would compare the

total weight with the weight that is appearing on the screen of trolley and given on the receipt issued if there is the difference the cashier would understand that there are some un-scanned products in the trolley and would check for it.

2. 360 DEGREE SCANNER/ BAR CODE READER

Fujitsu after introducing the U-Scan Shopper have also introduced a six sided 360 degree scanner. If this scanner or barcode reader is installed in to the trolley it would not be necessary to put the barcode exact in front of the scanner or the reader and it would automatically scan the product when it is being put in to the trolley. It is not always the case of shoplifting it is

sometimes genuine mistake on the part of customer that they would leave out a product or forget any to scan. This 360 degree scanner by the Fujitsu would prevent it and minimize the chances of the product not getting scanned (Fujitsu, 2007).

3. TROLLEY JAMMER

It is the normal routine in the supermarket or the retail store that the customers take the shopping cart or trolley with them to the parking to their car and leave it there, which afterwards is picked by the staff of the supermarket or the retail store. In the case of the intelligent trolley as it is an expensive item it is probable that the trolley might be taken and it would cost supermarket significantly. To secure it the radio frequency or wireless network system should be used. The specific range of the trolley would be set for example within the arena of the supermarket if it is taken beyond it would jam as its wheels would be connected to the electronic system. Even the screen on the trolley would indicate that how much distance from crossing the limit or boundaries before the wheels of the trolley would jam. There would also be sensors deployed at the exit gate of the supermarket or the retail store for example at the exit from parking which would detect any trolley if that passes and would indicate that to the systems of the management inside the supermarket.

4. TROLLEY INDICATOR

Trolley is installed with the navigation system and wireless network attaches it to the system of the store or the supermarket. Through this wireless connection the exact position of the trolley would always be indicated on systems of staff of the retail store or supermarket. The trolley would also indicate the position on the screen to the customer and indicate to him the exact meters left from the exit gate.

5. BUYING TROLLEY

Customers can be given an option to purchase their own trolley as ensuring their arrival to the store. The folding trolley can be introduced which would have the features of the intelligent trolley. Folding trolley would be easy for the customer to carry and keep in the back or trunk of the car. The loyalty card holders would be given discount on buying the intelligent trolley from the store. The regular customers would have their own trolley and thus would prevent the theft of misuse of the trolleys in the store. The trolleys sold to the customers would be having the same wireless network and radio frequency system therefore as the trolley would enter the arena of the supermarket it would synchronize it with the systems of the store or the supermarket and hence would provide up to date data to the customers.



EXTRA FEATURES

Some extra features can be added to the trolley in order to entertain the customers. Customers would have an option to listen to the music, chat to other customer and even could do browsing on the screen. Any latest offers would pop up onto the screens of the trolley and

indicate to the customer with a sound.

SURVEY ANALYSIS

The survey conducted over the visitors of the supermarkets or the retail stores show some aspects and the behavior of the consumers. The survey highlights some of the common problems and issues that consumers face at the stores. The population over which the survey was conducted showed that the most of them had used self checkout systems and more than 50% of the population was encountered with the difficulties using both the manual and the self checkout system. This reveals that the customers in the store face problems at the checkouts that are either they have to stand in lines or the system processing is slow. Regarding the self checkout system it can also be said that the customers might not be prone to it and found difficulty in using it as almost 42% of the population had never encountered with the problem while checking out. It was quite evident from the survey that the customers had to wait in long queues and were frustrated from it could also be concluded that they even had to stand for more than five minutes in the line. The intelligent trolley would most reduce the average time the consumers have to wait in long queues. As most of the population answered that the 5 minutes would be an acceptable time or them to wait in line to pay for their purchases. If the intelligent trolley is used optimally and the systems are completely integrated it would definitely reduce the time and help in reducing the customer frustration and gaining their satisfaction.

Shopping is a bit time consuming but a necessary activity and most of the people find it hard to take time out of their busy schedules to shop. It is evident from the research and the survey that the consumers mostly shop at least once a week. It would probably involve most of the time the necessary shopping like grocery and they want to spend less time and avoid the busy hours or the busy supermarkets. Thus waiting in long queues and searching for the products in aisles

consumes their lot of time. The item like the intelligent trolley would definitely ease their shopping and even reduce the crowd of customers in the stores. People mostly avoid the busy stores when they are engaged like they have less time off from the office or have guests coming at home or even at the occasions like Christmas in such circumstances more efficient processes will preferred. Most of the customers coming to the supermarkets or the retail stores use the trolley or the shopping cart as their purchases are greater in volume and could not be carried by hand hence the trolley could be seen a most common customer usage item at the store. Therefore such common item used by such greater volume providing the facility to the consumer would definitely attract the larger volume of customer than any other customer services offered at the store.

It has been seen in the survey that almost 67% of the population questioned in the survey would not bother traveling longer distances to reach their favorite or preferred supermarket or store and they would give preference going far to that store rather than shop from their nearest store. It is to be seen what makes the store impressive in the eyes of the customers and what takes to make it their preferred store. It would most evidently be the environment of the store that would constitute the services offered to them. The research reveals that the customers prefer the stores where they can find all their desired products, shopping is more convenient and they feel valued at the store. It is also evident from the survey that the customers preference regarding the store are both the product availability and the services offered there. The services would also involve the discount offers or the sales promotions that would give the chance to the consumers to save their money. These requirements of the consumers can be met through the introduction of intelligent trolley if it is used optimally. The intelligent would ease the shopping experience and

as the part of the integrated system would highlight the offers available and would also highlight it on the screen any offer available in the respective the customer is walking.

The latest recession made the consumers more price sensitive and they preferred the low cost items however when it comes to the purchase of food they will not compromise. They would prefer the quality over the cost of the product especially in the case of the eatables. Internet or online shopping has seen boom in the past recent years people prefer to shop online as it saves them time and along with that they have the long range of product variety and related information available. However the survey and the research reveals that most of the people are more concerned about the state of the product they are buying and like to inspect it physically before purchasing. It is evident from the survey that almost 28% of the customers decide about their mode of purchasing depending upon the products they have to buy. It is most evidently in the case of grocery shopping and the eatables that they prefer to inspect before they purchase. Hence this priority of the customers of product inspection makes them visit the stores and they avoid the online shopping even if that offers them time saving. Thus if the customers are offered time saving and the processes are made such efficient that they save the consumers time very high customer loyalty would be ensured.

Consumers have been open to both the self checkouts and the manual systems in which they are assisted by the staff at the store. Many customers have found it convenient and prefer using the self checkouts. It is also evident that most of the customers make their choice depending on which one is free as again the preference is saving the time and whatever the system is the one that is more convenient and time saving would be preferred. It is also evident from the survey that almost 80% of the customers make their shopping list when they go the supermarket or store for their scheduled shopping. It is observed that the customers who visit the stores weekly or

monthly have almost purchase the same products. In such scenario if the list from their previous visit is saved it would be of much convenience to them. The intelligent trolley provides the facility of uploading the shopping and keeps the record of the previous purchases which the customer can download on its shopping trolley and see on the screen.

Most of the customers have a fixed budget that they have to spend on the shopping for pleasure or even for the necessity items a budget has been planned to be spent on weekly or monthly grocery. The research reveals that the customers are often shocked to see the total price they have to pay for their purchases when they reach the cash counter. More than 85% of the customers have experienced such situation. It is also evident from the research that most of the customers almost 77% of them try to keep the track of the price and the total amount of the products they have kept in their trolley. Obviously keeping the record manually would not give them proper figures and even the huge calculation errors can be made. Intelligent trolley can play a vital role in this situation as it not only provides the price for the individual items but also automatically totals the amount of the products that have been picked by the consumer and customer can monitor and easily keep the track of the total amount they would have to pay and hence eases their shopping experience and would save them from the inconvenience and embarrassment they have to face if the total price is higher than their budget and they have to return the products.

Survey highlights that most of the customers find their specific suitable products easily but it is also evident that many find it hard finding the specific products. 80% of the customers are concerned about the contents of the product for example Halal or organic products and is hard for them to locate products with specific contents. Intelligent trolley would even satisfy these customers as it would provide them the navigation that would directly lead them to the products

and would also provide the complete information regarding the contents of the product. 67% of the population questioned said that they would like their paying experience to be faster and efficient and more than 80% preferred computerized systems over the manual. Intelligent trolley is a wireless electronic device that integrates with the internal system, issues the slip at the end of the shopping and is complete automatic computerized system with diverse features. Hence would probably make the payments faster, efficient and accurate.

CONCLUSION

Other Researches

The research highlights the advantages that the intelligent trolley offers, trolley being a modest item and the technological modification to it proves to be of great benefit not only to the stores but also to the consumers. The intelligent is a huge aspect of providing the long range of services to the customers and gain their satisfaction and loyalty. Different researches highlight that RFID is installed in to the intelligent trolleys that identifies the products and provides information regarding them to the customer. It is like a wireless system that has the facility of the internet and is also connected internally to the systems of the store. The retail industry has become much saturated as there is competition present in the market. The stores usually competed for achieving the low cost and provide the low price products to the customers. However they have reached such level that it has become hard to compete over price. All the stores have very strong and established value chains and the bigger supermarkets and retail store have achieved the economies of scale. Thus the introduction of such unique thing as intelligent trolley would attract the customers. Surveys and research conducted over the stores and supermarkets showed that the consumers had lots of issues due to the difficulties they faced during the shopping at the store. The different researches highlighted the average time customers had to spend in long queues to pay for their purchases and the time wasted in finding the desired products in the long aisles of the store. The studies revealed that the navigation would be installed in the shopping trolleys or the carts and the plasma screen attached to the trolley would display the products and their exact location to the customers on their plasma screen. The internet access provided to the customers would also ease their shopping the option of uploading the product list that can be downloaded

on the intelligent trolley. The shopping would become much convenient, easier and time would also be saved. The trolley would issue the receipt having the detail of the products and their prices.

Current Research

The research conducted over the intelligent trolley has added the aspect of the finance and highlighted its importance. The stores would be required to replace their current trolleys or the shopping carts and purchase the intelligent trolleys. They would be costly as they have the new technology installed and is not such a common item. Very few companies are offering this new technology that could be used to form the intelligent trolley. The RFID scanners with the navigation is being offered by the Fujitsu and was introduced in 2007 they are still making improvements to this new technology and would introduce improve model U-Scan Scanner very soon. The information technology setup of the whole would be required to be modified and upgraded this would be extra cost for the supermarkets and the retail stores besides the purchase of intelligent trolleys. The feasibility for the intelligent trolley made in the research highlights that initially stores would be required to make investment over the introduction of intelligent trolley but the trolley would offer them long term benefits. The customers would be attracted to the store and would feel valued as their data of previous transactions with the store would be shown on their insertion of loyalty card into the trolley.

Recommendations

Stores should go for the investment in the intelligent and keep some finance every year for its modification and improvement or the purchase of new models with higher features. The stores should integrate their internal systems and update them in order to properly synchronize with the

trolleys. The updated system would automatically update the stock and other information. Complete information should be updated on the websites and thus integrated with the systems on trolley the promotions, discounts and sales offers being offered to the customers would automatically appear on the screen of the trolley and thus would increase the sales volume and revenues of the store. The trolleys should be monitored on regular basis as to whether they are functioning properly and are synchronized and updated through the internal systems of the store. the regular monitoring would insure that the weight scanner and locators are properly working as they would prevent the shop lifting, theft and are also important for own security of the trolley. Before making the investment it has to be seen that the benefits outweigh the costs.

Limitations

There are many benefits that the intelligent trolley offers however its limitations also exist. Along with the limitations of the intelligent trolley the research conducted also had its limitations. The intelligent trolley is an electronic wireless system it is always open to malfunctioning and errors. Some customers who have used the trolley highlight that the trolley indicated them wrong direction and sometimes the wrong product. The receipts often do not come out of the trolley and on few occasions it has been seen that the discount that was given on the promotional activities was not adjusted. The barcode scanner installed was to be not working properly and it got stuck few of the times.

The research also had its limitations as the intelligent trolley is new product and is not so commonly used. Therefore there were few examples found of the practical usage of intelligent trolley by the consumers in the stores. It is a new idea and even some of the consumers who had used it found difficulties as they were not prone to it completely. Being a new idea very few companies are working on it so there was no variety of the intelligent trolley models available to

study and select the better one or recognize the company that is offering the best features with the price. Fujitsu along with the Microsoft were the two prominent companies and even in these two the Fujitsu was seen to be the only company that is regularly making modifications and has introduced U-Scan Scanner for the intelligent trolley.

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PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7

PAGE 8

PAGE 9

PAGE 10

PAGE 11

PAGE 12

PAGE 13

PAGE 14

PAGE 15

PAGE 16

PAGE 17

PAGE 18

PAGE 19

PAGE 20

PAGE 21

PAGE 22

PAGE 23

PAGE 24

PAGE 25

PAGE 26

PAGE 27

PAGE 28

PAGE 29

PAGE 30

PAGE 31

PAGE 32

PAGE 33

PAGE 34

PAGE 35

PAGE 36

PAGE 37

PAGE 38

PAGE 39

PAGE 40

PAGE 41

PAGE 42

PAGE 43

PAGE 44

PAGE 45